

## CLAIMS

1. A wall element for a magnetically shielded room, said wall element comprising

5 - at least one first layer (1) which is formed of metal plate having a high electrical conductivity,

10 - at least two layers, a second layer (2) and a third layer (3), which are formed of metal plate having a high magnetic permeability, characterized in that said layers (1, 2, 3) are superimposed one on top of another in surface contact with each other without any separating air gaps, so that each first layer (1) having a high electrical conductivity 15 lies between each second (2) and third layers (3) having a high permeability substantially in surface contact with the second and third layers, the layers together forming a compact structure in which the product  $(\sigma \times \mu)$  of electrical conductivity ( $\sigma$ ) and permeability ( $\mu$ ) is maximized so as to minimize the penetration depth of magnetic interference.

20 2. Wall element according to claim 1, characterized in that the wall element comprises a fourth layer (4), which is formed of a material having a high electrical conductivity, said fourth layer being superimposed on top of the second layer (2) to form an outside layer of the wall element.

25 3. Wall element according to claim 1 or 2, characterized in that the first layer (1) and/or the fourth layer (4) is an integral aluminum sheet.

30 4. Wall element according to any one of claims 1 to 3, characterized in that the second layer (2) and/or the third layer (3) is an integral  $\mu$ -metal sheet or formed of adjacent pieces of  $\mu$ -metal sheet.

5. Wall element according to any one of claims 1 to 4, characterized in that the composite structure of the wall element comprises two or more sets of first (1), second (2) and third (3) layers, in which structure the layers having a high electrical conductivity and the layers having a high permeability are alternately interleaved.

10 6. Wall element according to any one of claims 1 to 5, characterized in that the wall element comprises a fifth layer (5) which consists of elastic material substantially thinner than the first and/or second layer and which is disposed between the first layer (1) and the second layer (2) and/or between the first layer (1) and the third layer (3).

15 7. Wall element according to any one of claims 1 to 6, characterized in that, at the edge area of the wall structure, each inner layer reaches further out than the outer layer placed on top of the inner layer to expose each inner layer for contact.

20 8. Wall element according to any one of claims 1 to 7, characterized in that, at the edge area of the wall structure, the first layer (1) is disposed to reach further out than the other layers (2 - 5) so that a first surface (A) on each opposite side of the first layer is exposed for contact.

25 9. Wall element according to any one of claims 2 to 8, characterized in that, at the edge area of the wall structure, the second layer (2) is disposed to reach further out toward the edge than the fourth layer (4) so that a second surface (B) of the second layer (2) is exposed for contact.

30 10. Wall element according to any one of claims 1 to 9, characterized in that the layers (1 to 5) are secured to each other by gluing.

35 11. Wall element according to any one of claims 1 to 10, characterized in that that

the layers (1 to 5) are secured to each other by mechanical means.

12. Wall element according to any one of claims 1 to 11, characterized in that the total thickness of aluminum in the wall element is of the order of about 12 mm.

13. Wall element according to any one of claims 1 to 12, characterized in that the total thickness of  $\mu$ -metal in the wall element is of the order of about 2 mm.

14. Wall element according to any one of claims 1 to 13, characterized in that the wall element has the shape of a planar rectangle.

15. Wall element according to any one of claims 1 to 14, characterized in that the wall element is a corner element having a bend angle of 90°.

16. A magnetically shielded room comprising walls (100), a floor (101) and a ceiling (102), which are formed of wall elements (103, 104, 105) adjacently connected to each other to form a shell structure, said wall elements each comprising:

25 - at least one first layer (1) which is formed of metal plate having a high electrical conductivity,

30 - at least two layers, a second layer (2) and a third layer (3), which are formed of metal plate having a high magnetic permeability, characterized in that said layers (1, 2, 3) are superimposed one on top of another in surface contact with each other without any separating air gaps, so that each first layer (1) having a high electrical conductivity lies between each second (2) and third layers (3) having a high permeability substantially in surface contact with the second and third layers, the layers together forming a compact structure in which the product  $(\sigma \times \mu)$  of electrical conductivity ( $\sigma$ ) and perme-

ability ( $\mu$ ) is maximized so as to minimize the penetration depth of magnetic interference.

17. Room according to claim 15, characterized in that the wall element (103, 104, 105) 5 comprises a fourth layer (4) which is formed of a material having a high electrical conductivity and which fourth layer is superimposed on top of the second layer (2) to form an outermost layer of the wall element.

10 18. Room according to claim 16 or 17, characterized in that the first layer (1) and/or the fourth layer (4) is an integral aluminum sheet.

15 19. Room according to any one of claims 16 to 18, characterized in that the second layer (2) and/or the third layer (3) is an integral  $\mu$ -metal sheet or formed of adjacent pieces of  $\mu$ -metal sheet.

20 20. Room according to any one of claims 16 to 18 or 19, characterized in that the composite structure of the wall element (103, 104, 105) comprises two or more sets of first (1), second (2) and third layers (3), in which structure the layers having a high electrical conductivity and the layers of material having a high permeability are alternately interleaved.

25 21. Room according to any one of claims 16 to 20, characterized in that the wall element (103, 104) comprises a fifth layer (5) consisting of thin elastic material and disposed between the first layer (1) and the second layer (2) and/or between the first layer (1) and the third layer (3).

30 22. Wall element according to any one of claims 16 to 21, characterized in that, at the edge area of the wall structure (103, 104, 105), each inner layer reaches further out than the outer layer placed on top of the inner layer to expose said inner layer for contact.

23. Wall element according to any one of claims 16 to 22, characterized in that, at the edge area of the wall structure (103, 104, 105), the first layer (1) is disposed to reach further out 5 than the other layers (2 - 5) so that a first surface (A) on each opposite side of the first layer is exposed for contact.

24. Wall element according to any one of claims 16 to 23, characterized in that, at 10 the edge area of the wall structure, the second layer (2) is disposed to reach further out toward the edge than the fourth layer (4) so that a second surface (B) of the second layer (2) is exposed for contact.

25. Wall element according to any one of 15 claims 16 to 24, characterized in that the layers (1 to 5) are secured to each other by gluing.

26. Wall element according to any one of claims 16 to 25, characterized in that that 20 the layers (1 to 5) are secured to each other by mechanical means.

27. Wall element according to any one of claims 16 to 26, characterized in that the total thickness of aluminum in the wall element (103, 104, 105) is of the order of about 12 mm.

28. Wall element according to any one of 25 claims 16 to 27, characterized in that the total thickness of  $\mu$ -metal in the wall element (103, 104, 105) is of the order of about 2 mm.

29. Wall element according to any one of 30 claims 16 to 28, characterized in that the wall element (103) has the shape of a planar rectangle.

30. Wall element according to any one of claims 16 to 29, characterized in that the 35 wall element (104, 105) is a corner element having a bend angle of 90°.

31. Room according to any one of claims 16 to 30, characterized in that the room comprises at least one shell formed of said wall elements (103, 104, 105).

5 32. Room according to any one of claims 16 to 31, characterized in that the room comprises two or more nested shells formed of said wall elements (103, 104, 105).

10 33. Room according to any one of claims 16 to 32, characterized in that the room comprises connecting means (6, 10, 11) for connecting each two adjacent wall elements together, said connecting means being arranged to provide a continuous electrical and magnetic conductivity between the adjacent wall elements.

15 34. Room according to any one of claims 16 to 33, characterized in that the connecting means comprise a cover strip (6) to be placed on the seam area between the two adjacent wall elements, said cover strip (6) comprising a sixth layer (8) which is formed of a material having a high electrical conductivity, such as aluminum, and a seventh layer (9) which is formed of a material having a high permeability, such as  $\mu$ -metal, said seventh layer being superimposed on top of the sixth layer (8) and said seventh layer (9) being wider than the sixth layer (8) so that the seventh layer (9) thus has an exposed third surface (C) on either side of the sixth layer, whereby, when the cover strip is placed to cover the seam area, the sixth layer (8) is in contact with the first surfaces (A) of the first layers (1) of the adjacent wall elements, thereby providing electrical conductivity over the seam, and the third surfaces (C) of the seventh layer (9) are in contact with the second layers (2) and/or third layers (3) of the adjacent wall elements, thereby providing magnetic conductivity over the seam.

35. Room according to claim 34, characterized in that the cover strip (6) comprises an eighth layer (7<sup>1</sup>), consisting of thin elastic material disposed between the sixth layer (8) and the seventh 5 layer (9).

36. Room according to claim 34 or 35, characterized in that the cover strip (6) comprises a ninth layer (7<sup>2</sup>), consisting of thin elastic material disposed on top of the seventh layer (9) 10 on the opposite side with respect to the sixth layer (8).

37. Room according to any one of claims 33 to 36, characterized in that the connecting means comprise a pair of beams (10, 11) to be connected with bolts for clamping the seam area from 15 opposite sides of the wall elements.

38. Room according to any one of claims 33 to 37, characterized in that a beam (11) placed on the outer side of the room, being made of electrically conductive material and set in contact with the 20 fourth layers (4) of the adjacent wall elements, provides for electrical conductivity between said fourth layers.